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AUTHOR(S):

Bieri, Robert

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A THIRD BLUE CHAETOGNATH AND NOTES ON THE DISTRIBUTION OF HYPONEUSTON OBSERVED IN SITU

ROBERT BIERI

Antioch College, Yellow Springs, Ohio 45387

On February 20, 1977 at 1500 local time I saw a dark blue chaetognath while making in situ observations on the distribution and behavior of hyponeuston. This is the third reported observation of a blue chaetognath, the other two reports by David, 1964 and Bieri, 1966. The details of the observations given below confirm my earlier opinion that this is a rare and temporary phenomenon most likely due to the eating of blue pontellid copepods. The micro-spatial distribution of the blue, sea-surface community is maintained in Beaufort three seas and winds and is quickly re-established after more turbulent conditions.

Puerto Angel in the state of Oaxaca, Mexico, (Lat. 14.8 N, Long. 96.4 W), has a variety of rocky headlands and reefs that jut into the surf zone and sea. While examining a small reef that jutted about 100 meters into the sea at an angle of 30 degrees from the shore line, I was surprised to see dense concentrations of zooplankton in the top meter of water. I saw a similar concentration at the same time of day but under a calmer sea on the island of Yoron in the Okinawa archipelago. The zooplankton was more varied at Puerto Angel in terms of the major plankton groups present and the microdistribution different. At Yoron-to the zooplankton, consisting almost exclusively of chaetognaths and ctenophores, was arranged in cylindrical tubes about a meter in diameter, two to three meters long and one to two meters apart, the long axis of the cylinders running perpendicular to the surf line. At Puerto Angel the patches of chaetognaths and ctenophores were of the order of one-half to three-quarters of a meter in diameter, a meter or two long and were not arranged as regularly with respect to one another. Pontellid copepods, shrimp zoea and medusae were observed between the patches of chaetognaths and ctenophores.

While observing the distribution and behavior of the different species, I estimate that I saw on the order of one to two thousand chaetognaths, mostly *Serratosagitta pacifica*. Late in the observations I was surprised to see a single dark blue chaetognath. This is similar to the relative incidence that I saw at Shirahama (Bieri 1966). I was able to watch it for one to two minutes until it was lost in the wave turbulence. It was clearly a sexually mature *Aidanosagitta neglecta* and most often was oriented vertically, head up, as were most of the other chaetognaths. There was no food in the gut. The blue color was in the muscle tissue because the head was dark blue and the body appeared lined by blue but was pale blue, nearly clear around the gut. The seminal vesicles were cream colored. The fins were not visible.

The chaetognaths were closely associated with very large numbers of dark blue, almost black pontellid copepods. These occurred in concentrations of 50 to 100 per liter of water but were not uniformly distributed. They most often appeared to be arranged in vertical sheets, the top of the sheets being about ten cm below the sea surface. The sheets were up to one meter long, a cm or so thick with the top about ten cm below the surface and extending down to about 40 cm below the sea surface. The sheets of pontellids were sometimes inclined at an angle of 30 to 40 degrees from the vertical and were gently curved or bowed as if bent by turbulence. When I broke up a sheet with my hand, the pontellids quickly reformed into a new sheet. The spacing between the pontellids was very regular and averaged between $1\frac{1}{2}$ and $2\frac{1}{2}$ cm. I had the impression of looking at the knots in a net and wondered if this were an aid to raptorial feeding (Lillelund and Lasker 1971). Dr. A. Fleminger has told me that the pontellids were most likely *Labidocera acuta*.

As at Yoron-to, the extremely dense patches of chaetognaths had ctenophores in them, in this case *Bolinopsis* and *Ocyropsis*. Both species were in feeding positions but I could not see that they were eating chaetognaths. Somehow the patches of pontellids and chaetognaths were maintained separately. There were other blue zooplankton present, the most common being shrimp zoea. These were comparatively widely spaced, on the order of 10 to 20 cm apart and seemed to be cruising more or less randomly in the upper one to one and one-half meters of water.

Since we know that by far the most common food of chaetognaths is copepods and since the pontellids were by far the most common blue organism present, it seems most probable that one or more of these was the source of the pigment in the *Aidanosagitta neglecta* even though the chaetognaths and pontellids seemed to be in separate patches of water.

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